

WHAT IS CLAIMED IS:

1. A disk apparatus for reproducing a disk on which information is recorded by pits or marks with various lengths, comprising:

5           a photodetection unit configured to divisionally detect light reflected by the disk as a plurality of photodetection signals; and

          a tracking error signal generation unit configured to generate a tracking error signal on the basis of a  
10       phase difference between the plurality of photodetection signals detected by the photodetection unit, wherein the tracking error signal generation unit includes:

          an equalization unit configured to equalize  
15       waveforms of the plurality of photodetection signals detected by the photodetection unit, and

          the equalization unit has frequency-gain characteristics that obtain a gain of not less than 15 dB at a frequency corresponding to a shortest pit or  
20       mark.

2. An apparatus according to claim 1, wherein the equalization unit has frequency-gain characteristics that obtain a gain of not more than -3 dB at a frequency three times the frequency corresponding to  
25       the shortest pit or mark.

3. An apparatus according to claim 1, wherein the equalization unit includes:

a high-pass filter having frequency-gain characteristics in which a gain is constant within a first frequency range not more than a first frequency, a gain is constant within a second frequency range not less than a second frequency which is more than the first frequency, and a gain increases in a third frequency band between the first and second frequencies, and

a low-pass filter having frequency-gain characteristics in which a gain attenuates within a fourth frequency band not less than a third frequency.

4. An apparatus according to claim 2, wherein the equalization unit includes:

a high-pass filter having frequency-gain characteristics in which a gain is constant within a first frequency range not more than a first frequency, a gain is constant within a second frequency range not less than a second frequency which is more than the first frequency, and a gain increases in a third frequency band between the first and second frequencies, and

a low-pass filter having frequency-gain characteristics in which a gain attenuates within a fourth frequency band not less than a third frequency.

5. An apparatus according to claim 4, wherein the first frequency range is a frequency range 0.5 to 1.5 times a frequency corresponding to a pit or mark

with which a reproduction signal amplitude saturates,  
the second frequency range is a frequency range  
0.5 to 1.5 times the frequency corresponding to the  
shortest pit or mark,

5 the third frequency matches the frequency  
corresponding to the shortest pit or mark, and  
a Q value of the low-pass filter is not less  
than 2.

6. An apparatus according to claim 1, wherein a  
10 transfer function H of the equalization unit is given  
by:

$$H = (1 + 3.99 \times 10^{-8}s) /$$
$$(1 + 1.58 \times 10^{-8}s + 1.41 \times 10^{-16}s^2 + 1.24 \times 10^{-24}s^3)$$
$$s = j\omega \text{ (complex frequency)}$$

15 7. An apparatus according to claim 5, wherein a  
ratio of the shortest pit or mark to the pit or mark  
for which the reproduction signal amplitude saturates  
is 2 : 8.

8. An apparatus according to claim 1, wherein the  
20 gain at the frequency corresponding to the shortest pit  
or mark is not less than 0.

9. An information processing method for  
processing a signal read out from a disk on which  
information is recorded by pits or marks with various  
25 lengths, comprising:

divisionally detecting light reflected by the disk  
as a plurality of photodetection signals;

equalizing waveforms of the plurality of detected photodetection signals by an equalizer having frequency-gain characteristics that obtain a gain of not less than 15 dB at a frequency corresponding to a shortest pit or mark; and

generating a tracking error signal on the basis of a phase difference between the plurality of equalized signals.

10. A method according to claim 9, wherein the equalizer has frequency-gain characteristics that obtain a gain of not more than -3 dB at a frequency three times the frequency corresponding to the shortest pit or mark.

11. A method according to claim 9, wherein the equalizer includes:

a high-pass filter having frequency-gain characteristics in which a gain is constant within a first frequency range not more than a first frequency, a gain is constant within a second frequency range not less than a second frequency which is more than the first frequency, and a gain increases in a third frequency band between the first and second frequencies, and

a low-pass filter having frequency-gain characteristics in which a gain attenuates within a fourth frequency band not less than a third frequency.

12. A method according to claim 10, wherein the

equalizer includes:

a high-pass filter having frequency-gain characteristics in which a gain is constant within a first frequency range not more than a first frequency, a gain is constant within a second frequency range not less than a second frequency which is more than the first frequency, and a gain increases in a third frequency band between the first and second frequencies, and

a low-pass filter having frequency-gain characteristics in which a gain attenuates within a fourth frequency band not less than a third frequency.

13. A method according to claim 12, wherein the first frequency range is a frequency range 0.5 to 1.5 times a frequency corresponding to a pit or mark with which a reproduction signal amplitude saturates, the second frequency range is a frequency range 0.5 to 1.5 times the frequency corresponding to the shortest pit or mark,

the third frequency matches the frequency corresponding to the shortest pit or mark, and

a Q value of the low-pass filter is not less than 2.

14. A method according to claim 9, wherein a transfer function H of the equalizer is given by:

$$H = (1+3.99 \times 10^{-8}s) /$$
$$(1+1.58 \times 10^{-8}s+1.41 \times 10^{-16}s^2+1.24 \times 10^{-24}s^3)$$
$$s = j\omega \text{ (complex frequency)}$$

15. A method according to claim 13, wherein a  
5 ratio of the shortest pit or mark to the pit or mark  
for which the reproduction signal amplitude saturates  
is 2 : 8.

16. A method according to claim 9, wherein the  
gain at the frequency corresponding to the shortest pit  
10 or mark is not less than 0.